国際宇宙ステーションへの高エネルギー電子降込みによる被ばく量推定

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Radiation dose estimates of high-energy electron precipitation at the International Space Station

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High energy electrons sporadically precipitate into the earth's atmosphere at subauroral latitudes during pre-midnight. This event is called relativistic electron precipitation (REP). REP may cause non-negligible radiation exposure for astronauts during their extravehicular activity. The atmospheric ionization due to REP events may also contribute significant ozone depletions. The quantitative observations and the statistical analysis of REP events is therefore an important topic in order to evaluate such influences for both future space utilizations and fundamental understanding of space-atmosphere connections.
Recently, it turned out that REP events have been frequently observed at the international space station (ISS) orbit passing through the high magnetic latitude (Kataoka et al., 2016). We analyze the REP events at ISS using our Standard Dose Monitor (SDOM) which also observes radiation environment at the ISS orbit. SDOM observes the energy spectrum of electrons in the energy range from 0.5 MeV to 20 MeV. The example during the REP event in shown in Fig. 1. It was confirmed that the MeV electron flux increased during the REP event. We can also obtain the energy spectrum of the REP event as represented in Fig. 2. We report the statistical results of a number of REP events at ISS, and discuss the evaluated dose rate during the REP events.

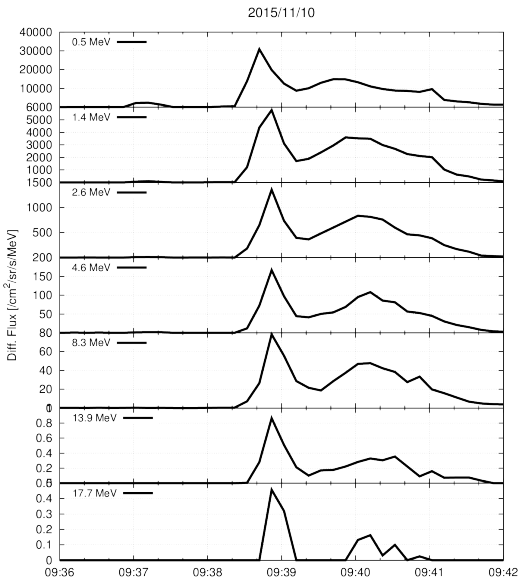

Figure 1. The time profile of the REP event as observed by SDOM on 2015/11/10. The increase of flux around 0939 UT corresponds to the REP event.

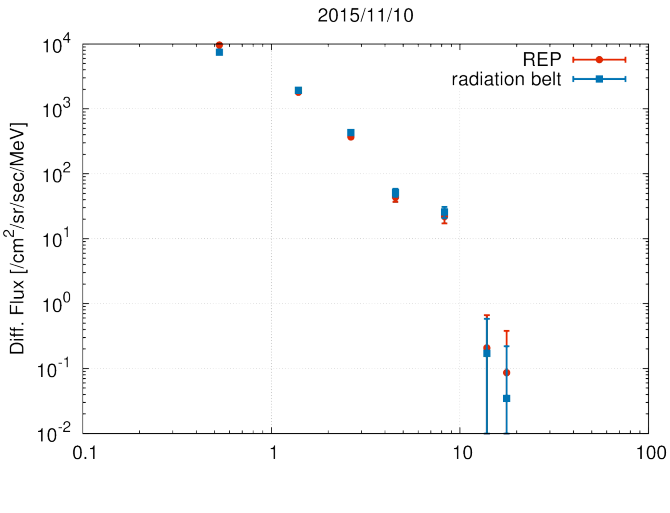

Figure 2. The energy spectrum of electrons. The red circles and blue squares correspond to the REP event (0939 UT) and radiation belt (0940 UT), respectively.

References

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